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Flying Operations

C-5 OPERATIONS PROCEDURES

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SUMMARY OF REVISIONS:

Change 1 to AFI 11-2C-5V3, 1 January 2000, implements a complete revision to Chapter 4 and shall be reviewed entirely. **POSTING INSTRUCTIONS:** This is a page-for-page change. Users should print Change 1 using duplex head-to-head printer settings and replace the following pages: 1 thru 4 and 31 thru 64. Pages 60 thru 63 are annotated as omitted on page 59.

Publications: AMCI 11-206, 11-208, AMCMAN 11-211 (S), AMCPAM 11-3 and 55-21 (AMC).

Forms: AMC Form 41, 43, 54, 97, 196, 305, and 423 (AMC).

SUPPORTING INSTRUCTIONS:

AFI 11-2C-5V3 Addenda A--*C-5 Aircraft Configuration and Mission Planning*
AFI 11-2C-5V3 Addenda B--*C-5 Special Operations Low Level (SOLL) II*
AFI 11-2C-5V3 CL-1--*Loadmaster Briefings*
AFI 11-2C-5V3 CL-2--*Combat Operations*
AFI 11-2C-5V3 CL-3--*Airdrop Operations--Crew*
AFI 11-2C-5V3 CL-4--*Airdrop Operations--Loadmaster*
AFI 11-2C-5V3 CL-5--*SOLL II--Pilot*
AFI 11-2C-5V3 CL-6--*SOLL II--Navigator*
AFI 11-2C-5V3 CL-7--*SOLL II--Engineer*
AFI 11-2C-5V3 CL-8--*SOLL II--Scanner*
AFI 11-2C-5V3 CL-9--*SOLL II--Loadmaster*
AFI 11-2C-5V3 CL-10--*Hot Refueling (Cockpit Crew)*
AFI 11-2C-5V3 CL-11--*Hot Refueling (Ground Crew)*

manpower shortfalls. During contingencies, exercises, or designated “interfly” missions, interfly operations will be conducted under the following conditions or as specified in the OPLAN or CO-OPS.

3.10.2. When approved, interfly during normal day-to-day operations under the following conditions:

3.10.2.1. Aircraft ownership will not be transferred.

3.10.2.2. As a minimum, crews will be qualified in the MDS and model as well as systems or configuration required to fly the aircraft and/or mission.

3.10.2.3. During interfly, crew member (s) will follow "basic" operational procedures (see Combined Operations, paragraph 1.5.1.) and must thoroughly brief MAJCOM-Specific items.

3.10.2.4. Initiate interfly approval request by the unit or agency requesting the agreement by memo or message format to the OG/CC controlling the resource. Each commander involving resources (personnel or aircraft) (or MAJCOM, if appropriate) must concur with interfly proposal. Request must include details of the deployment or mission including; aircrew name(s), duration, or special circumstances.

Chapter 4

AIRCRAFT OPERATING RESTRICTIONS

4.1. Objective. The ultimate objective of the aircraft maintenance team is to provide an aircraft for launch with all equipment operative (Fully Mission Capable, FMC). However, redundant systems allow safe operation with less than all equipment operative and under certain circumstances, some missions can be safely operated without all equipment being operative.

NOTE: The AC is the final authority in determining an overall status of an aircraft.

Make a detailed explanation of the discrepancy in the AFTO Form 781A, **Maintenance Discrepancy and Work Document**; include the following maintenance identifiers to effectively communicate aircraft status:

4.1.1. Mission Essential (ME). An item, system, or subsystem component essential for safe aircraft operation or mission completion will be designated ME by the AC. An AC accepting an aircraft (one mission or mission segment) without an item or system does not commit that AC (or a different AC) to subsequent operations with the same item or system inoperative.

4.1.2. Mission Contributing (MC). An item, system, or subsystem component, which is not currently essential for safe aircraft operation or mission completion, will be designated as MC. These discrepancies should be cleared at the earliest opportunity to the extent that maintenance skills, ground time, and spare part availability permit. If circumstances change or in the AC's judgment mission safety would be compromised, re-designate as ME. Do not delay a mission to correct an MC discrepancy.

4.1.3. Open Item (OI). Discrepancies not expected to adversely impact the current mission or any subsequent mission are designated OI. These items receive low priority and are normally worked upon mission termination at home station.

4.2. MEL Policy. It is impractical to prepare a list that would anticipate all possible combinations of equipment malfunctions and contingent circumstances. The Minimum Equipment List (MEL) lists the minimum equipment and systems to launch the aircraft under routine operations. The list does not necessarily include all equipment or systems essential to airworthiness (e.g. rudder, ailerons, elevators, flaps, tires, etc.). Those items that state a minimum requirement and have no listed exceptions are grounding items.

4.2.1. The AC is responsible for exercising the necessary judgment to ensure no aircraft is dispatched with multiple items inoperative that may result in an unsafe degradation and/or an undue increase in crew workload. The possibility of additional failures during continued operation with inoperative systems or components shall also be considered. This chapter is not intended to allow for continued operation of the aircraft for an indefinite period with systems/subsystems inoperative. The MEL shall not conflict with the flight manual or USAF/MAJCOM directives. Safety-of-flight is paramount.

4.2.2. System components required to complete emergency procedures and associated warning systems will be operative. All emergency equipment will be installed unless specifically exempted by mission requirements/directives; e.g., depot inputs with minimum survival kits.

NOTE: Do not accept aircraft from factories, modification centers, or depots unless all instruments are installed and operative.

4.2.3. Waiver Policy. If after exploring all options, an AC determines a safe launch is possible with an MEL item inoperable, the AC shall request a waiver. Perform an ORM assessment prior to initiating a waiver request. Use C2 channels to notify the appropriate execution agency of intentions. Initiate waiver requests as soon as possible; plan on a 1-hour response time.

4.3. Waiver Protocol. Waivers to operate with degraded equipment may be granted on a case-by-case basis. Waiver authority is based on "who" has operational control and execution of the aircraft performing a specific mission. The AC determines the need for a waiver and initiates the request. MEL waiver authority is as follows:

4.3.1. Training Missions (executed by unit OG/CC or equivalent). Waiver authority is OG/CC or equivalent who has execution authority of the mission.

4.3.2. AMC-Directed Missions (Includes JA/ATTs). Waiver authority for active duty, AFRC, or ANG units flying AMC or AMC-directed missions controlled by TACC (includes HQ AMC Operational Readiness Inspections) is HQ AMC/DO. HQ AMC/DOV personnel are the authorized agent and maintain 24-hour watch through the TACC.

4.3.2.1. The following shall be provided in order to process a waiver request: 1) crew qualification, 2) reason for request, 3) mission leg(s) requiring the waiver, and 4) the governing directive of waiver request to include volume, chapter, or paragraph.

4.3.3. Other Missions (Contingencies). Waiver authority is listed in the OPORD/Tasking Order, etc., or is the DIRMOBFOR (or equivalent) for the agency with C2 of the aircraft. Crew members may request additional assistance or confirmation of policy from their home unit, AMC/DOV, or as specified in the MAJCOM supplement.

4.3.4. ANG or AFRC Directed Missions. ANG or AFRC maintains C2 and waiver authority for ANG or AFRC directed mission prior to mobilization. Waivers must be obtained from ANG/DO or HQ AFRC/DO as appropriate.

4.3.5. Non-AMC Missions. For user command assigned aircraft according to Air Force Policy Directive (AFPD) 10-9, (e.g., AETC, PACAF, USAFE, etc.,) waiver authority is the appropriate MAJCOM/DO or as specified in MAJCOM supplement.

4.3.6. Other Than MEL Waivers. Determine governing source document (eg. AFI, Flight Manual, Maintenance T.O., etc.) to ascertain the waiver authority. Use C2 channels to notify the appropriate waiver authority. Waivers of this nature may require an extended response time.

4.4. Technical Assistance. The AC may request, at anytime in the decision process, technical support and additional assistance from their home unit, MAJCOM, and/or C2 agency. See **Chapter 10**, Local Operating Procedures, for appropriate telephone numbers.

4.4.1. ACs electing to operate with degraded equipment or aircraft systems (with appropriate waiver) must coordinate mission requirements (i.e., revised departure times, fuel requirements, maintenance requirements, etc.) with the controlling C2 agency.

4.4.2. If beyond C2 communication capability, or when it is necessary to protect the crew or aircraft from a situation not covered by this chapter and immediate action is required, the AC may deviate according to Paragraph **1.4**. Report deviations (without waiver) through channels to MAJCOM/DO within 48-hours. Units must be prepared to collect background information and submit a follow-up written report upon request.

4.5. Definitions/C-5 Column Identifiers.

4.5.1. Installed – Number of components or systems installed.

4.5.2. Required – Minumum number required to depart a location. An asterick (*) indicates number required is situation dependent; refer to Remarks/Limitations/Exceptions column for clarification.

4.5.2.1. Home Station **(A)**. Home station mission originator. Aircraft transiting their home station will normally fall under column B for MEL criteria.

4.5.2.2. En route **(B)**. All other locations.

NOTE: A few en route locations posses the capability to provide C-5 maintenance repairs. Such a station has the necessary skilled maintenance personnel, support equipment, technical data, and parts on hand to accomplish some major and minor repairs. Common sense and good judgement must be used by all concerned when determining minimum equipment requirements to preclude adverse operational impact or excessive maintenance support requirements. In those instances where lack of replacement parts or qualified personnel would cause a mission delay, the aircraft may continue operations as described in the MEL.

4.5.2.3. Local Training. A mission that departs home station to perform home station training and returns in the same flight duty period.

NOTE: Normally, local missions will operate under column A unless designated "**(B/L)**" whereby they may operate under column B and/or the associated Remarks/Limitations/Exceptions.

4.5.2.4. Off-Station Training. A mission that departs home station to perform training, as directed by the wing commander, without returning the same day. These missions will be supported by deployed home station logistics.

NOTE: Off-Station Trainers are considered local training for the purposes of this chapter.

4.5.3. Remarks/Limitations/Exceptions. Some technical information and procedures are contained in this column. This is not all-inclusive; crewmembers shall refer to the flight manual and other directives for procedures, techniques, limitations, etc.

4.5.3.1. One-time Flight Clarification: Normally a Red X discrepancy downgraded for a one-time flight. Cargo may be carried as long as safety-of-flight is not compromised. The priority is to move the airplane to a repair capable facility; once repaired, the mission can be completed. ACs must coordinate with appropriate agencies to ensure repair capability exists at the destination. One-time flights may include en route stops only when necessary to recover the airplane. ***Example***: An airplane departs on a gear-down flight from Djibouti IAP and requires an en route fuel stop (Cairo) before landing at the nearest repair capable facility, Sigonella AB.

4.5.3.1.2. MAJCOM approval required for one-time flight to repair capable facility: Informs the AC that under certain conditions, MAJCOM may approve a one-time flight.

4.5.3.1.3. One-time flight to nearest repair capable facility: Flight is limited to the nearest (shortest en route time) repair capable base.

4.5.3.1.4. One-time flight to a repair capable facility: Same as **4.5.3.3** except the flight is not restricted to the nearest repair capable facility.

4.5.3.2. Other Mission and Repair Clarifications:

4.5.3.2.1. Shall be repaired at next repair capable facility: Mission may continue as scheduled, item shall be repaired upon reaching a repair capable facility. Designate item ME upon reaching repair facility. Once maintenance action is initiated, and it is determined repairs are not possible, the AC will discuss possible courses of action with command and control.

4.5.3.2.2. Repair as soon as practical: Item should be repaired when ground time permits. Do not delay the mission even if at a maintenance capable facility.

4.5.3.2.3. Mission may continue: Regardless of location, do not delay the mission, continue as scheduled. Item is designated MC, repair per paragraph **4.1.2.**

4.5.3.2.4. Mission dictates requirement: Consider entire mission not just the next leg. ***Example:*** An airplane is departing an en route station with maintenance capability, after engine start the FE discovers the #1 engine anti-ice is inoperative. Icing conditions are not forecasted for the next leg. However, because the mission spans several days and repair capability does not exist at the scheduled en route stops, the AC elects to have the item repaired prior to departing.

4.6. C-5 MEL. This MEL applies to all C-5 models and lists the minimum equipment and systems to launch the aircraft under routine operations. The MEL does not include all equipment or systems essential to airworthiness. The MEL is not intended to promote continued operation of the aircraft for an indefinite period with systems/subsystems inoperative. See this chapter for further information including objectives, policy, and waiver protocol. Required items specific to SOLL operations are listed in **Addenda B**, *C-5 Special Operations*.

Table 4.1. Engines/Auxiliary Power Units (APU).

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
1-1. Engine Fuel Pump	4	4	3	**(B)** Both affected fuel tank boost pumps shall be operative. One-time flight to nearest repair capable facility if only low-pressure element is inoperative.
1-2. Continuous Ignition	4	4	3	**(B)** Requires MAJCOM approval. One-time flight to nearest repair capable facility. Normal and Airstart position shall be operative
1-3. Start Ignition	4	4	4	Either Normal or Airstart position shall be operative.
1-4. Starter	4	4	4	
1-5. Fuel Heater	4	4	3	**(B/L)** Required on flights with fuel temperature below 0° C. Valve must be failed closed.
1-6. Oil Pressure Indicating System				
a. Low Oil Pressure Switch	4	4	3	**(B/L)** The low oil pressure light may be inop if the oil pressure gauge is operative.
b. Oil Pressure Gauge	4	4	4	
1-7. Oil Temperature Indicator	4	4	4	
1-8. Oil Filter Differential Pressure Light	4	4	3	**(B/L)** Mission may continue if malfunction is determined to be an indication problem and the oil filter has been checked for clogging or indication of bearing failure (metal chips). The engine oil filter shall be checked at every stop until the indication malfunction is corrected. Carry spare seals.
1-9. N1 Indicator	8	8	*	**(B/L)** If possible, place the operative indicator at the engineer panel. Associated N2 shall be operative. **(B)** Both may be inoperative, at least one shall be repaired at next repair capable facility.
1-10. N2 Indicator	8	8	1/Eng	**(B/L)** If possible, place the operative indicator at the engineer panel. Associated N1 shall be operative.
1-11. TIT Indicator	8	8	1/Eng	**(B/L)** If possible, place the operative indicator at the engineer panel.
1-12. Fuel Flow Indicator	8	8	1/Eng	**(B/L)** If possible, place the operative indicator at the engineer panel.
1-13. Engine Overheat & Fire Detection System	4	4	4	System shall be capable of detecting both an engine fire and overheat condition. 1. Do not take-off with a shorted system. 2. Fire warning and ovht test shall be operative. **(B)** Open circuits. Take-off from a non-repair capable facility only. Shall be repaired at next repair capable facility. No more than one open circuit may exist and the location of the break shall be determined. Reverify open at each enroute stop.
a. Engine Fire Annunciator/Warning Light	8	8	*	**(B)** One light shall function at the pilot or engineer position. The associated fire handle light shall be operative. Shall be repaired at next repair capable facility.
b. Engine Overheat Annunciator/Warning Light	8	8	*	**(B)** One light shall function at the pilot or engineer position. The associated fire handle light shall be operative. Shall be repaired at next repair capable facility.
c. Engine/Pylon Optical Fire Detection System	4	4	*	**(B)** Fire, ovht, and short discriminator tests shall be operative. Shall be repaired at next repair capable facility.

Table continued on next page.

Table 4.1. Engines/APU (Continued).

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
1-14. Engine Fire Extinguishing System				
a. Engine Fire Handle	4	4	4	**(B)** Handles shall be fully capable of automatic isolation of system components as outlined in T.O. 1C-5A-1. If the light in the handle is inoperative, the associated annunciator light shall operate at both pilot and flight engineer positions.
b. Bottle Out Light	4	4	3	**(B)** En route with no maintenance, if cockpit indicator is inop, check the pressure gauge on the bottle. Mission may continue via en route stops with proper maintenance stands; repair as soon as practical.
c. Fire Extinguisher Bottle	4	4	4	**(B)** A squib assembly can be obtained from either APU fire bottle. Remove the squib designated "alternate."
d. Fire Extinguisher Discharge Button	4	4	4	Shall be capable of firing bottles.
e. Fire Extinguisher Bottle Select Switch	2	2	2	Both Normal and Alternate positions shall be fully operable.
1-15. Thrust Reverser	4	4	2	**(B)** May only be deactivated in symmetrical pairs IAW T.O. 1C-5A-2-4. Verify all actuators are attached to the translating cowl and that all locks are locked prior to deactivation. No thrust reverser may be deactivated if any hydraulic actuator leaks beyond limits. Outboard T/Rs--repair as soon as practical. Inboard T/Rs--shall be repaired at next repair capable facility. Deactivation of inboard T/Rs require restricted flight to FL 250.
a. THRUST REV PRESSURE light	4	4	2	**(B)** Thrust Reversers must be deactivated as described above.
b. TH REV N LKD light	4	4	4	
c. TH REV EXTD light	4	4	2	**(B)** T/Rs shall be deactivated. Limit use to reverse idle
1-16. Engine Cowl "Blowout" Door	8	8	8	
1-17. Engine Anti-Ice	4	4	*	**(B/L)** Engine and nacelle anti-ice required for flights into forecasted icing conditions.
1-18. APU	2	2	1	**(B/L)** Refer to T.O. 1C-5A-1, Section II, for operation with single APU operation. APU CONTROL circuit breaker shall remain closed.
1-19. APU Bleed Valve	2	2	1	**(B/L)** Required for each operative APU.
1-20. APU Isolation Valve	2	1	1	If one APU Iso valve is inoperative, both APUs shall be capable of providing bleed air. If valve is failed closed to the respective APU, the APU bleed valve shall be operative to supply bleed air for the ATM and the other APU shall be capable of supplying bleed air and electrical power IAW T.O. 1C-5A-1, Section II. If the valve is failed open, the respective APU bleed valve shall be operative.
1-21. APU Isolation Valve Open Light	2	1	0	Valve operation shall be confirmed prior to every departure.
1-22. APU Fire Warning System	2	2	1	**(B/L)** For ground operations, do not operate affected APU and associated ATM unless a fire guard is present.

Table continued on next page.

Table 4.1. Engines/APU (Continued).

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
1-23. APU Fire Bottle	2	2	1	**(B/L)** For ground operations, do not operate affected APU and associated ATM unless a fire guard is present.
1-24. APU Exhaust Gas Temperature (EGT) Indictor	2	2	1	**(B/L)** Shall be operative on any APU that is planned to be operated. Off flag may be in veiw as long as indicator functions.
1-25. APU Door Open Light	2	2	0	**(B/L)** Confirm door is closed before departure.
1-26. APU Start Light	2	2	1	**(B/L)** Starting will be closely monitored by the scanner.
1-27. APU On Speed Light	2	2	0	**(B/L)** Verify on speed by checking APU generator frequency.

Table 4.2. Bleed Air, Environmental, Etc. Systems.

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
2-1. Air Conditioning Pack	2	2	1	**(B/L)** One pack may be inoperative if floor heat is operative and aircraft is capable of maintaining pressurization. Due to increased structural fatigue, if both packs are inoperative, aircraft is limited to one-time unpressurized flight below 10,000' MSL with MAJCOM approval**.**
2-2. Air Conditioning Master Switch	1	1	1	Shall have control of air conditioning packs.
2-3. Air Conditioning Overheat Light	2	2	1	**(B/L)** Required for each operating pack.
2-4. Air Conditioning Overheat Sensor	2	2	1	**(B/L)** Required for each operating pack.
2-5. Airflow Selector Switch	1	1	0	**(B/L)** May be electrically inoperative provided valves can be manually positioned.
2-6. Compartment Temperature Indicator	3	0	0	Unmanned compartments shall be monitored for proper temperature. Close troop comp shutoff valve if unoccupied. **(A)** If indicator is inoperative, Auto mode must function.
2-7. Flight Station Temp Control	1	*	*	Auto mode may be inoperative provided temp control valve can be positioned manually or with control switch in manual.
2-8. Relief Compartment Temp Control	1	*	*	Auto mode may be inoperative provided temp control valve can be positioned manually or with control switch in manual.
2-9. Cargo Compartment Temp Control	1	*	*	Auto mode may be inoperative provided temp control valve can be positioned manually or with control switch in manual.
2-10. Troop Compartment Temp Control	1	*	*	Auto mode may be inoperative provided temp control valve can be positioned manually or with control switch in manual. If compartment is unoccupied, valve will be closed.
2-11. Troop Compartment Shutoff Valve	1	1	*	**(B/L)** May be electrically inoperative, provided control valve can be positioned manually.
2-12. Cooling Air Exit Door	2	2	1	**(B/L)** Door shall be installed. If the door is stuck closed, do not operate the affected A/C below .3 Mach, with slats extended or when the aircraft is on the ground. If the door is stuck open, do not flight plan above FL 280 to prevent A/C pack freezing.
2-13. Cooling Air Exit Valve	2	2	1	**(B/L)** Required for operating air conditioner.
2-14. Cooling Fan	2	2	1	**(B/L)** If fan is inoperative, do not operate the affected system on the ground, or with slats extended, or below .3 Mach.

Table continued on next page.

Table 4.2. Bleed Air, Environmental, Etc. Systems (Continued).

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
2-15. Cooling Fan Control Valve	2	2	1	**(B/L)** If valve failed closed, do not operate the affected system on the ground, or with slats extended, or below .3 Mach.
2-16. Primary Heat Exchanger High Limit Sensor	2	2	1	**(B/L)** Required for operating pack.
2-17. Primary Heat Exchanger Temp Control Sensor	2	2	1	**(B/L)** Required for operating pack.
2-18. Flow Control and Shut-off Valve	2	2	1	**(B/L)** Required for each operating pack
2-19. Low Limit Temperature Control Sensor	2	2	0	**(B/L)** May be electrically inoperative if manual control is available. If one sensor or control box is inop, install the bad component in the right-hand system.
2-20. Low Limit Temperature Control Valve	2	2	0	**(B/L)** May be inoperative if manual control is available. If possible, change components to make left system operative; i.e., swap sensor, control box, etc. with right system.
2-21. Diverter Valve	1	1	0	**(B/L)** May be electrically inoperative provided it can be manually positioned.
2-22. Alternate Air Valve	1	1	0	**(B/L)** May be electrically inoperative provided it can be manually positioned.
2-23. Aux Vent Valve	1	1	1	**(B)** May be electrically inoperative provided it can be manually positioned. One-time flight to repair capable facility.
2-24. Bleed Duct Ovht Sys	3	3	3	
2-25. Bleed Air Shutoff Valve	4	4	3	**(B)** May be failed closed only: verify using manifold pressure gauge.
2-26. Bleed Air Shutoff Valve Indicator Light	4	4	2	**(B/L)** One may be inoperative per wing, provided valve can be checked for proper operation during bleed down check. To verify operation with APU supplying pressure, turn on engine anti-ice with pylon bleed air shutoff valve in the open position and look for a pressure drop, then close valve while looking for pressure increase.
2-27. Pressurization System				**Note:** Unless directed by other chapters of this instruction, (e.g., airdrop) the aircraft should not be flown unpressurized. **(B)** If inop, MAJCOM approval for one-time flight to repair capable facility, not to exceed 10,000' cabin altitude.
2-28. Automatic Pressure Controller	1	0	0	May be inoperative provided manual mode is fully operative. If the manual controller fails inflight, use AC Master Switch, floor heat, and engine bleed valves to control pressurization.
2-29. Manual Pressure Controller	1	1	0	**(B)** Shall be operative for pressurized flight. If inop, MAJCOM approval for one-time flight to repair capable facility, not to exceed 10,000' cabin altitude. Outflow and Thrust Recovery valves must be open.
2-30. Outflow Valve Indicator	1	1	0	**(B/L)** Cabin rate of climb and differential pressure indicator shall be operative. Use the scanner to complete preflight steps.
2-31. Outflow Valve Thrust Recovery Valve	1 ea	2	0	**(B)** Both shall be operative for pressurized flight. Outflow and Thrust Recovery valve(s) may be failed (open only); MAJCOM approval required for one-time flight to repair capable facility, not to exceed 10,000' cabin altitude.

Table continued on next page.

Table 4.2. Bleed Air, Environmental, Etc. Systems (Continued).

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
2-32. Cabin Altimeter and Differential Pressure Indicator	1	1	0	**(B)** Shall be operative for pressurized flight. MAJCOM approval for one-time flight to repair capable facility, not to exceed 10,000' MSL. Cabin Press Low Light shall be operative.
2-33. Cabin Press Low Light	1	1	0	**(B/L)** Cabin Altimeter/Differential Pressure indicator shall function for flights above 10,000' MSL.
2-34. Cabin Rate of Climb Indicator	1	1	0	**(B/L)** Automatic pressurization controller, cabin altimeter and differential pressure indicator, and Cabin Press Low Light shall be operative. If any component listed above is inoperative, one-time unpressurized flight to repair capable facility permitted, not to exceed 10,000' MSL.
2-35. Emergency Depress System	1	1	0	**(B)** Shall be operative for pressurized flight. MAJCOM approval for one-time flight to repair capable facility, not to exceed 10,000' MSL. Cabin Press Low Light shall be operative.
2-36. Floor Heat System	1	1	0	**(B/L)** If only one AC pack is operating, the floor heat system is required to maintain cabin altitude below 10,000'. If inop, both AC packs shall be operative to maintain cabin altitude below 10,000'. One system (Fwd or Aft) may be inoperative if both packs are operable. Exception: N/A for pattern locals. **(B)** Shall be operative if cargo requires temperature-controlled environment.
2-37. Floor Heat Duct Anticipator	2	2	0	**(B/L)** The affected floor heat valve(s) will cycle. Not recommended when using manual pressurization. N/A when floor heat is not used.
2-38. Manifold Bleed Air Pressure Indicator	1	1	1	
2-39. Pressure Aug Valve	4	4	2	**(B/L)** May be failed closed.
2-40. Pressurization Mode Selector Switch	1	1	0	**(B)** Manual mode must be operative for pressurized flight. If inoperative, Outflow and Thrust Recovery valves must be open. MAJCOM approval for one-time flight to repair capable facility, not to exceed 10,000' MSL.
2-41. Start Valve Open Light	4	4	4	
2-42. Temp Aug Valve	4	4	*	**(B/L)** May be inoperative (failed closed) for operation in non-icing conditions.
2-43. Wheel Well Isolation Valve	1	0	0	Shall be able to manually close the valve.
2-44. Wing Isolation Valve	2	2	1	**(B/L)** Operative valve will be closed during bleed duct overheat procedures until malfunctioning valve can be manually closed.
2-45. Safety Valve	2	2	0	**(B)** Both shall be operative for pressurized flight. If inop, Thrust Recovery and Outflow valves must be fully open. MAJCOM approval required for one-time flight to repair capable facility, not to exceed 10,000' MSL
2-46. Pitot Heat System (Mast and Head Heat)	2	2	1	Both required for flights in RVSM airspace. **(B/L)** One system may be inop for flights conducted in non-icing conditions in VMC.
2-47. AoA De-ice System	2	1	1	One system shall be fully operative. Associated stallimiter must also be operative.

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Table 4.2. Bleed Air, Environmental, Etc. Systems (Continued).

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
2-48. Windshield Heat	5	3	2	Side vision window heat may be inop. **(A)** The 3 front windshield panels shall function. **(B)** Must have windshield heat for at least 2 of the 3 front windshield panels.
2-49. Windshield Wiper	2	2	*	**(B/L)** One system shall be operative for flights into forecast precipitation at arrival or departure.
2-50. Total Temp Probe	2	2	2	
2-51. Total Air Temperature (TAT) Indicator	1	0	0	Use FSAS total temp information.

Table 4.3. Hydraulics.

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
3-1. 1-2 PTU	1	1	0	**(B/L)** May be inoperative provided #1 ATM and #1 & #2 engine-driven pumps (all) are operative.
3-2. 2-3 PTU	1	1	0	**(B/L)** May be inoperative provided the 1-2 and 3-4 PTUs, and #2 and #3 engine-driven pumps (all) are operative.
3-3. 3-4 PTU	1	1	0	**(B/L)** May be inoperative provided #4 ATM and #3 & #4 engine-driven pumps (all) are operative.
3-4. ATM "ON" Light	2	2	1	**(B)** May be inoperative if ATM is made inoperative. Hydraulics must be isolated.
3-5. ATM	2	2	1	**(B/L)** Applicable PTU and engine-driven pumps shall be operative. Complete required preflight items after engine start. **Caution:** Do not perform anti-skid check w/engines running.
3-6. Electric Suction Boost Pump	2	2	*	**(B/L)** Associated hydraulic suction boost pump shall be operative. If the filter button is popped, system filters must be checked for contamination. If both pumps are inop, one-time flight to nearest repair capable facility.
3-7. Engine-Driven Hydraulic Pump	8	8	6	All pumps shall have positive depress capability. **(B/L)** Check associated system filters for contamination. Adjacent PTUs shall be operative. Only one pump on two nonadjacent engines may be inoperative.
3-8. Flight Engineer Hydraulic Pressure Gauge	4	4	*	**(B/L)** Direct reading gauge shall be operative and periodically monitored. **(B)** Two gauges may be inoperative for one-time flight to repair capable facility. Associated PRESS LOW lights shall be operative.
3-9. Flight Engineer Hydraulic Quantity Indicator	4	4	3	**(B/L)** Sight gauge shall be monitored periodically.
3-10. Hydraulic Boost Press Low Light	4	4	*	Monitor associated system(s). **(B)** Mission may continue with one light inoperative; repair at next repair capable facility. Two lights may be inoperative for a one-time flight to a repair capable facility.
3-11. Hydraulic Pressure Gauge (Direct Reading)	4	4	3	**(B/L)** Flight engineer hydraulic pressure gauge shall be operative.
3-12. Hydraulic Pump Press Low Light	8	8	6	**(B/L)** Associated flight engineer hydraulic pressure gauge shall be operative. Depress unaffected hydraulic pump. No more than one light on each non-adjacent engine may be inoperative

Table continued on next page.

Table 4.3. Hydraulics (Continued).

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
3-13. Hydraulic Reservoir Sight Gauge	4	4	0	**(B/L)** May be capped if flight engineer hydraulic quantity indicator is operative. Verify hydraulic quantity prior to launch.
3-14. Hydraulic Suction Boost Pump	4	4	2	**(B/L)** #1 and #4 may be inoperative if the respective electrical suction boost pump is operative. Check hydraulic filter buttons for contamination indications. If #2 or #3 boost pump fails, swapping the failed boost pump with either #1 or #4 is permissible provided no contamination is present.
3-15. RAT	1	1	1	
3-16. RAT Deploy Light	1	1	0	**(B/L)** May be inoperative, monitor RAT unlocked light to indicate RAT is deployed.
3-17. RAT Unlocked Light	1	1	1	

Table 4.4. Landing Gear. (Refer to Gear Down Flight Notes)

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
4-1. Anti-Skid System				Operation with less than all anti-skid components operative is an emergency procedure and shall be IAW T.O. 1C-5A-1.
a. Anti-Skid Off Light	1	1	1	**(B)** MAJCOM approval required for one-time flight to repair capable facility.
b. Brakes Light	1	1	0	**(B)** Determine status of brakes prior to takeoff. One-time flight to repair capable facility.
c. No Brakes Light	1	1	1	**(B)** MAJCOM approval required for one-time flight to repair capable facility.
d. DET Fail Light	1	1	1	**(B)** MAJCOM approval required for one-time flight to repair capable facility.
4-2. Normal Brake Pressure Indicator	1	1	0	**(B)** Shall be repaired at next repair capable facility. EMER HYD brake pressure light shall be operative. Alternate brake pressure indicator and flight engineer's #4 pressure gauge shall be operative. Select alternate brakes for landing. If normal brakes are required for landing, perform a Brake System Check (Inflight).
4-3. Alternate Brake Pressure Indicator	1	1	0	**(B)** Shall be repaired at next repair capable facility. Normal brake pressure indicator and flight engineer's #1 pressure gauge shall be operative. Select normal brakes for landing. If alternate brakes are required for landing, perform a Brake System Check (Inflight).
4-4. EMER HYD Brake Pressure Light	1	1	0	**(B)** Shall be repaired at next repair capable facility. Normal brake pressure indicator shall be operative.
4-5. Emergency Brake Accumulator	1	1	1	
4-6. Parking Brake	1	1	0	**(B/L)** If inop, brakes shall be guarded at all times when chocks are removed. Scanner shall install chocks in the event of an emergency. One-time flight to repair capable facility. Do not accomplish kneeling/loading/unloading with engines running. Local missions--may be flown at the discretion of the instructor pilot.

Table continued on next page.

Table 4.4. Landing Gear (Continued). (Refer to Gear Down Flight Notes)

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
4-7. Castering System	1	1	0	**(B/L)** Mission dictates requirement.
a. MLG Free Lights	2	2	*	**(B/L)** Copilot shall monitor position indicators. If lights are inop, do not accomplish kneeling operations.
b. Aft MLG Position and Emergency Control Switch	2	2	*	**(B)** Limit caster operations. Shall be repaired at next repair capable facility. Mission segments limited to tow-capable locations. Normal caster shall be operative.
4-8. Emergency Extend Switch	5	5	0	**(B)** One-time flight with affected gear down to nearest repair capable facility.
4-9. Kneeling System	1	1	0	**(B)** All main landing gear shall be capable of inflight kneeling. If not capable, one-time flight with the affected MLG gear down to nearest repair capable facility.
4-10. Landing Gear Warning System				
a. Landing Gear Warning Horn	1	1	0	**(B)** Shall be repaired at next repair capable facility.
b. Landing Gear Warning Light	2	2	*	**(B)** One light may be inoperative. If both lights are inoperative, one-time flight to a repair capable facility. All gear position indicators shall be operative.
c. Landing Gear Warning Test Button	1	1	0	**(B)** Shall be repaired at next repair capable facility.
d. Horn Silence Button	1	1	0	**(B)** Shall be repaired at next repair capable facility.
e. Emergency Switch On Light	1	1	0	**(B)** One-time flight w/all gear down to nearest repair capable facility.
f. Bogie Pitch Annunciator Light	4	4	0	**(B)** One-time flight with affected gear down to nearest repair capable facility.
4-11. NLG Fiber Optics Scope	1	1	0	**(B)** One-time flight with NLG down to nearest repair capable facility.
4-12. NLG Inspection Light	3	1	0	Light for the fiber optics target required day or night. **(B)** One-time flight with NLG down to nearest repair capable facility.
4-13. MLG Inspection Light	2/ gear	1/ gear	*	**(B/L)** One per MLG should be operative for night operations. If both lights are inoperative, attempt to use a light from a wheel well with two operative lights.
4-14. Nose Gear Steering	1	1	1	Both Normal and Emergency Systems shall be operative.
a. Rudder Pedal Steering	1	1	0	**(B)** Nose Gear Steering System (wheel) shall be operative. Shall be repaired at next repair capable facility.
4-15. Position and Indicating Systems	1	1	0	**(B)** One-time flight with affected gear down to nearest repair capable facility. Prior to landing, affected gear will be visually verified for proper down and locked indications at sequence control panel and inspection covers/fiber optics.
4-16. Relay Logic System	3	3	*	**(B)** One-time flight with affected gear down to nearest repair capable facility. Prior to landing, affected gear will be visually verified for proper down and locked indications. With MAJCOM approval, mission may continue using Alternate MLG Retraction Procedures (Standard Configuration).
4-17. Crew Entrance Door Accumulator	1	1	1	
4-18. APU Accumulator (Left/Right)	2	2	0	**(B)** If inoperative, one-time flight with affected gear (2) down to nearest repair capable facility.

GEAR DOWN FLIGHT NOTES:

1. Line Missions. Gear down flight operations will be limited to those sorties required to move the aircraft to the nearest repair capable facility. Gear down flight should only be considered after reasonable efforts to repair the aircraft have been attempted.

2. Local Training Missions. Local missions will not be planned gear down. When inflight malfunctions prohibit gear retraction (except MLG rotational malfunctions), the local may continue after the cause of malfunction has been identified and the AC and maintenance supervisor concur. Do not exceed 200 KCAS/M.60.

3. Gear Down Flight Procedures.

3.1. Plan to not exceed 200 KCAS/M.60 to help prevent APU servicing door and gear door damage. When range is a factor, fly an airspeed that yields the maximum range; do not exceed 250 KCAS/M.60.

3.2. For planned gear down flight, the affected gear shall be pinned. The APU servicing door panel will be speed taped upon completion of the 1C-5A-1 preflight and prior to flight. Taping may help prevent loss of the door panel. Only the door panel on the appropriate side requires speed tape.

3.3. After each gear down flight, make an AFTO Form 781A entry requiring a visual inspection prior to the next flight. The MLG inspection will include affected gear-well area, LN2 servicing panel (if applicable), and doors. NLG inspection will include gear-well area, doors, folding bulkhead door, actuators, and brackets. This inspection may be accomplished by the flight engineer.

Table 4.5. Flight Controls.

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
5-1. AILERONS				
a. Aileron Actuator	2	2	2	
b. Aileron Trim Actuator	2	2	1	**(B)** Mission may continue with one actuator inoperative. Shall be repaired at next repair capable facility. Aileron shall be centered prior to flight.
c. Aileron Trim Position Indicator	1	1	0	Required for touch-and-go operations. **(B/L)** Ailerons shall be centered prior to flight.
d. Aileron Artificial Feel	1	1	0	**(B)** One-time flight to repair capable facility.
e. PACS Roll System	1	1	0	**(B)** Shall be repaired at next repair capable facility.
5-2. ALDCS	1	1	*	**(B)** Shall be repaired at next repair capable facility. When scheduled for air refueling, every effort should be made to launch with an operative ALDCS.
5-3. Autopilot	1	1	*	**(B/L)** Mission dictates requirement. Pitch autopilot required for flights through RVSM airspace.
5-4. ELEVATORS				
a. Inboard Elevator Actuator	2	2	2	
b. Outboard Elevator Actuator	3	3	3	
c. Elevator Artificial Feel System (VFUs)	2	2	*	**(B/L)** One may be inoperative. **(B)** If both are inoperative, one-time flight to nearest repair capable facility. Do not engage pitch autopilot.
d. PACS Pitch System	1	1	0	**(B)** Shall be repaired at next repair capable facility.

Table continued on next page.

Table 4.5. Flight Controls (Continued).

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
5-5. Flap Slat Asymmetry System	1	1	1	
5-6. Flap Position Indicator	1	1	0	**(B)** One-time flight to repair capable facility. Slat indicator shall be operative. Scan flaps to verify approximate position.
5-7. Flight Augmentation Systems (Lat, Yaw, Pitch)	1 ea.	1 ea	0	Refer to flight manual. May fly with lateral, yaw, or pitch faults. **(B)** For inoperative yaw augmentation axis, one-time flight to repair capable facility. Applicable autopilot axis will be inoperative.
5-8. Flight Spoilers	10	10	10	
5-9. Ground Spoilers	8	8	8	
5-10. Horizontal Stabilizer Pitch Trim				
a. Normal Pitch Trim	1	1	0	**(B)** One-time flight to nearest repair capable facility. Alternate and manual trim shall be operative.
b. Alternate Pitch Trim	1	1	0	**(B)** One-time flight to nearest repair capable facility. Normal and manual trim shall be operative.
c. Manual Pitch Trim	1	1	1	
d. Trim Disconnect Switch	2	2	1	**(B)** Seat with operative switch shall be occupied at all times. One-time flight to repair capable facility.
e. Horizontal Stabilizer Trim Position Indicator	1	1	1	
5-11. Ratio Shifters	2	2	0	**(B/L)** Select matching position. Flaps down postion should be operative.
5-12. Flight Control Hydraulic System Off Light	54	54	*	Check the affected system for proper operation prior to flight. Flight spoilers--one light per system per side may be inoperative. Other flight controls--one light may be inoperative per flight control. **(B)** MAJCOM approval required when more than one light per flight control is inoperative. One-time flight to repair capable facility
5-13. Flight Hydraulic Power Shutoff Valve	54	54	*	**(B)** One inop per flight control; verify valve is open prior to takeoff. Shall be repaired at next repair capable facility.
5-14. RUDDERS				
a. Rudder Actuator	4	4	4	
b. Rudder Limiter	1	1	0	**(B/L)** Select MIN Q to assure full rudder travel is available. **(B)** Shall be repaired at next repair capable facility.
c. Rudder Trim	1	1	0	**(B)** Shall be repaired at next repair capable facility. Yaw Aug Man Trim shall be operative
d. Rudder Trim Position Indicator	1	1	0	Required for touch-and-go operations. **(B/L)** One turn-and-slip indicator shall be fully operative; visually center the rudder prior to flight. Line missions -- repair as soon as practical.
e. Emergency Rudder (Yaw Aug Man Trim)	1	1	0	**(B)** One-time flight to repair capable facility.
5-15. Slat Position Indicator	1	1	0	**(B)** One-time flight to repair capable facility. Flap indicator shall be operative. Visually scan to verify approximate slat position.
5-16. Slat Drive Disconnect Switch	1	1	0	**(B)** One-time flight to repair capable facility. Takeoff and Landing will be conducted with slats retracted.

Table 4.6. Fuel Systems. (Refer to Notes)

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
6-1. Aerial Refuel System.	1	*	*	Mission dictates requirement.
6-2. Aerial Refuel Slipway Light	2	*	*	Mission dictates requirement. At least one light required for night air refueling.
6-3. Main Tank Boost Pump	2/Tank	8	*	**(B)** One pump per tank may be inoperative. Open affected pump CB. Crossfeed and isolation valves shall be operative.
6-4. Auxiliary Tank Boost Pump	2/Tank	8	*	**(B/L)** One pump per tank may be inoperative. **(B)** Both pumps may be inop if tank is not serviced with fuel; refuel valve may be failed (closed only). If both pumps are inoperative and fuel is required, consider using a boost pump from an aux/extended range tank with two operative pumps.
6-5. Extended Range Tank Boost Pump	2/Tank	8	*	**(B/L)** One pump per tank may be inoperative. Both pumps may be inop if tank is not serviced with fuel; refuel valve may be failed (closed only). **(B)** If both pumps are inoperative and fuel is required, consider using a boost pump from an aux/extended range tank with two operative pumps.
6-6. Main Fuel Boost Pump Out Light	4	4	3	**(B)** Both pumps shall be operative. Place both boost pumps on. One-time flight to repair capable facility. MAJCOM approval required when more than one light is inoperative.
6-7. Engine Fuel Boost Pump Pressure Low Light	4	4	3	**(B)** Both main boots pumps shall be operative. Place both boost pumps on. One-time flight to repair capable facility. MAJCOM approval required when more than one light is inoperative
6-8. Fuel Jettison Valve	2	2	1	**(B)** One valve may be inop (failed closed) if all separation valves are operative.
6-9. Fuel Temperature Selector	1	1	1	
6-10. Fuel Temp Indicator	1	1	1	
6-11. Main Tank Fill Valve	4	4	3	**(B)** One valve may be inop (failed open). Control fuel level with associated aux/ext range tank boost pumps. One-time flight to repair capable facility.
6-12. Aux Tank Refuel Valve	4	4	0	**(B/L)** Valves may be inop (failed closed) if the tank is not needed for fuel.
6-13. Extended Range Tank Refuel Valve	4	4	0	**(B/L)** Valves may be inop (closed only) if the tank is not needed for fuel.
6-14. Isolation Valve	4	4	3	**(B)** One valve may be inop (closed only) if not needed for other fuel transfer methods. Respective crossfeed valve shall be operative. One-time flight to repair capable facility.
6-15. Separation Valve	3	3	2	**(B/L)** Center separation valve may be failed closed if both aerial refuel isolation valves are operative. Outboard separation valves may be failed closed if the respective iso and crossfeed valves are operative.
6-16. Crossfeed Valve	2	2	1	**(B/L)** One valve may be inop (closed only), if not needed for other fuel transfer methods. Respective isolation valves shall be operative. Shall be repaired at next repair capable facility.
6-17. Ground Refuel Isolation Valve	2	2	1	**(B/L)** If center separation valve is inop (failed closed), both AR Iso Valves shall be operative.
6-18. Manifold Press Low Light	4	4	2	**(B/L)** Inboard lights may be inop provided the associated manifold pressure gauge is operative.

Table continued on next page.

Table 4.6. Fuel Systems (Continued). (Refer to Notes)

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
6-19. Fuel Manifold Pressure Indicator	2	2	1	Mission dictates requirement. Both shall be operative for planned air refueling. **(B/L)** Separation valves and manifold press low lights shall be operative.
6-20. Sump Low Warning	2	2	0	**(B/L)** The system shall be made safe prior to flight. Associated outboard main tank boost pumps (2) shall be operative. Refer to T.O. 1C-5A-1, Section III, Main Sump Low Procedures.
6-21. Main Tank Low Light	2	2	1	**(B)** One-time flight to repair capable facility.
6-22. Vent Fill Light	2	2	0	**(B)** Control fuel level with associated aux/ext range tank boost pumps to preclude over filling. Shall be repaired at next repair capable facility.
6-23. Fuel Quantity Totalizer	1	1	0	**(B)** Serviced tanks must have operative indicators. Shall be repaired at next repair capable facility.
6-24. Fuel Quantity Indicators				All fuel quantity indicators necessary for air refueling shall be operative (may be waived by MAJCOM). Do not launch with more than one inoperative fuel quantity indicator per wing. Symmetrically opposite indicator shall be operative.
a. Main Tank Fuel Quantity Indicator	4	4	3	**(B)** No more than one indicator may be inoperative.
b. Auxillary Tank Fuel Quantity Indicator	4	4	*	**(B/L)** Mission dictates requirement. If fuel is not required in a tank with an inoperative indicator, verify the tank is empty prior to flight.
c. Extended Range Tank Fuel Quantity Indicator	4	*	*	Mission dictates requirement. If fuel is not required in a tank with an inoperative indicator, verify the tank is empty prior to flight.

FUEL SYSTEM NOTES:

1. Fuel System Failures. Comply with procedures in T.O. 1C-5A-1 and T.O. 1C-5A-2-5.

2. For Ground Refueling Procedures with Inoperative Fuel Quantity Indicator, refer to Chapter **12**.

3. Fuel Quantity Indicator Failure In Flight.

3.1. Line Missions. Comply with T.O. 1C-5A-1, Section III. Continue as scheduled provided item 6-24 Remarks/Limitations/Exceptions are met and the destination has capability to safe affected tank IAW T.O. 1C-5A-2-5.

3.2. Local Missions. Comply with T.O. 1C-5A-1, Section III and land as soon as practical. Flight may resume provided item 6-24 Remarks/Limitations/Exceptions are met, maintenance personnel determined the nature of the malfunction, and the tank has been made safe IAW T.O. 1C-5A-2-5.

3.3. Air Refueling Missions.

3.3.1. Normal Procedures (Non Fuel Emergency).

3.3.1.1. Line Missions. Comply with T.O. 1C-5A-1, Section III. Symmetrically opposite indicator shall be operative. Do not air refuel with more than one inoperative fuel quantity indicator per wing.

3.3.1.2. Local Missions. Do not conduct air refueling with an inoperative indicator until maintenance action has been performed (see para 3.2).

3.3.2. Abnormal Procedures.

3.3.2.1. Servicing. During air refueling, fuel is placed in tanks with operative indicators first. Tanks with inoperative indicators should be serviced internally by transfering a known quantity from another tank.

3.3.2.1.1. Unless T.O. 1C-5A-1, Section 5, Maximum Allowable Fuel Differential limits are going to be exceeded, do not accomplish internal servicing until termination of refueling. However; if necessary, internal servicing may be accomplished in the precontact position.

3.3.2.2. When a main tank indicator is inoperative and total main tank fuel quantity is less than 30,000 pounds, simultaneously fill all main tanks prior to servicing other tanks using the following procedures:

3.3.2.2.1. Position the AUTO REF switch to MAN for transfer. Monitor symmetrically opposite indicator to judge quantity in tank with inoperative indicator.

3.3.2.2.2. After filling the main tanks, disconnect and obtain an off-load report to verify the quantity of fuel in the tank with the inoperative indicator. Air refueling may continue after confirming main tank fuel quantity. Further servicing of a tank with an inoperative indicator should be made using known quantities from internal sources.

3.3.2.2.3. If a fuel imbalance is suspected (heavy wing or excessive aileron trim requirements), terminate air refueling and obtain an off-load report. Prior to internal fuel transfer, verify quanity of fuel in tanks with inoperative indicators. Refueling may be continued after fuel is balanced.

Table 4.7. Electrics.

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
7-1. AC Load Meter	5	5	3	**(B/L)** Shall be operative for each working generator.
7-2. AC Volt Meter	1	1	1	
7-3. Gen Volt & Frequency Selector Switch	1	1	1	
7-4. Battery	2	2	1	**(B)** One-time flight to repair capable facility. Disconnect inoperative battery.
7-5. Battery Light	1	1	0	**(B)** One-time flight to repair capable facility.
7-6. Battery Switch	1	1	0	**(B)** Shall be able to select and turn off operable battery. One-time flight to repair capable facility.
7-7. Bus Ties	4	4	3	**(B/L)** One BTC may be failed (open only) provided associated generator and GLC is operative. **(B)** One-time flight to repair capable facility.
7-8. Bus Tie Open Light	4	4	4	
7-9. CSD	4	4	3	**(B/L)** One may be inoperative and disconnected provided the bus tie system (all functions) is operative. The oil level of the disconnected CSD will be checked for proper oil quantity prior to flight and during all subsequent en route stops. Do not fly more than 50 hours with a disconnected CSD (nonwaiverable).
7-10. CSD Fail Warning	4	4	3	**(B/L)** Shall be operative for each working generator/CSD.
7-11. CSD Temperature Gauge	4	4	3	**(B/L)** May be inop if CSD Fail light is operative.
7-12. DC Load Meter	2	2	1	**(B)** Shall be operative for corresponding T/R.
7-13. DC Volt Meter	1	1	0	**(B)** Prior to applying electrical power, check battery voltage using external meter. One-time flight to repair capable facility.

Table continued on next page.

Table 4.7. Electrics (Continued).

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
7-14. DC Volt Meter Selector Switch	1	1	0	**(B)** One-time flight to repair capable facility.
7-15. Emergency Bus Power Relay	1	1	1	
7-16. Emergency Generator	1	1	1	
7-17. Engine Driven Generator	4	4	3	**(B/L)** One may be inoperative provided the bus tie system (all functions) is operative. SCM airplanes on Shuttle Container Transport missions, shall have all 4 generators operative.
7-18. Frequency Meter	1	1	1	
7-19. Generator Fail Light (Engines)	4	4	3	**(B/L)** Shall be operative for each working generator.
7-20. Generator Fail Light (APU)	2	2	1	**(B/L)** Shall be operative for each working APU.
7-21. Generator Out Light (Engine)	4	4	3	**(B/L)** Shall be operative for each working generator.
7-22. Generator Out Light (APU)	2	2	1	**(B/L)** If inoperative, do not select associated APU generator.
7-23. Generator Load Controller	4	4	3	**(B/L)** Shall be operative for each working generator.
7-24. Isolated Bus Switch	1	1	1	
7-25. 325 Amp Current Limiter	1	1	1	
7-26. 400 Amp Current Limiter	1	1	0	**(B)** Both transformer rectifiers shall be operative. One-time flight to a repair capable facility.
7-27. Phase Selector Switch	1	1	1	
7-28. #1 Avionics AC Bus Off Warning Light and Relay	1	1	0	**(B)** If light and/or relay are inoperative, open the INS Emer Switch C/B on Avionics AC Bus #1. In this configuration, normal INS attitude switching is possible. One-time flight to repair capable facility.
7-29. Transformer Rectifier	2	2	1	**(B)** 400 amp current limiter shall be operative. One-time flight to nearest repair capable facility.
7-30. Aircraft Lighting				See ***AFI 11-202V3*** requirements. Nav lights (at least one bulb in each position) required for night operations. Anticollision lights (1 upper and 1 lower) required for day or night operations. Strobe lights may be inoperative.

Table 4.8. Instruments.

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
8-1. Flight Director System	2	2	1	Both required for CAT II ILS.
8-2. Go-Around Attitude Subsystem	1	1	0	**(B/L)**
8-3. Navigation Selector Panel	2	2	*	Portions may be inoperative. Available approaches and/or mission dictate requirement.
8-4. Auxiliary Navigation Selector Panel	2	0	0	
8-5. Pilot Bearing Distance Heading Indicator (BDHI) Systems	2	2	*	**(B/L)** Mission and available approaches dictate requirement.
8-6. Horizontal Situation Indicator (HSI)	2	2	1	**(B)** Shall be repaired at next repair capable facility. Pilot with inoperative HSI shall have an operative BDHI.
8-7. Remote HSI Heading and Course Selector Panels	2	0	0	HSI heading and course selectors must be operative.
8-8. Attitude Director Indicator	2	2	2	
8-9. Rate-of-Turn Sensor	2	2	*	**(B/L)** One must be operative for flight in IMC. With inoperative indicator, corresponding ADI must be operative.
8-10. Central Air Data Computer (CADC)	2	2	2	When one CADC is replaced, and the pitot static system has not been disturbed, a leak check is not required. Cross-check pilot and copilot airspeed indicators at 80 knots on takeoff roll. Abort the takeoff if airspeed differs by five knots or more. **Exception:** Maintenance leak and accuracy checks are required before flights in RVSM airspace
8-11. Nav's Altimeter	1	*	*	Required for airdrop and SOLL missions.
8-12. Nav's Vertical Velocity Indicator (VVI)	1	*	*	Required for airdrop and SOLL missions.
8-13 Nav Bearing Distance Heading Indicator (BDHI) System	1	*	*	Required for airdrop and SOLL missions.
8-14. Nav's Selector Panel	2	*	*	Required for airdrop and SOLL missions
8-15. Nav's Airspeed Indicator	1	*	*	Required for airdrop and SOLL missions.
8-16. Nav's TAS Indicator	1	*	*	Required for airdrop and SOLL missions.
8-17. Nav's TAS Indicator Selector Switch	1	*	*	Required for airdrop and SOLL missions.
8-18. Magnetic Compass	1	1	1	
8-19. Accelerometer	1	1	0	**(B/L)** MADAR shall be capable of monitoring inflight loads.
8-20. Vertical Scale Flight Instruments (VSFI)				
a. AoA Indicator	2	2	0	**(B/L)** At least one stallimeter shall be operative.
b. Mach Indicator	2	2	0	**(B/L)** Use corresponding calibrated airspeed to maintain desired Mach.
c. Airspeed Indicator	2	2	2	
d. Vertical Velocity Indicator (VVI)	2	2	2	
e. Altimeter	2	2	2	

Table 4.9. Avionics.

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
9-1. VHF Command Radio	2	2	1	**(B/L)** When possible, install in the #1 position.
9-2. UHF Command Radio	2	2	1	**(B/L)** When possible, install in the #1 position.
9-3. L-Band SATCOM	1	1	0	**(B/L)** Notify TACC if inoperative (N/A locals).
a. L-Band SATCOM Laptop Computer	1	1	0	**(B/L)** Notify TACC if inoperative (N/A locals).
9-4. VHF Nav Radio	2	2	1	**(B/L)** When possible, install in the #1 position.
9-5. HF Radio	2	2	*	**(B/L)** Mission dictates requirement.
9-6. ADF				
a. A-model aircraft	2	1	*	**(B/L)** Mission dictates requirement.
b. B-model aircraft	1	1	*	**(B/L)** Mission dictates requirement.
9-7. TACAN	2	2	1	**(B/L)** When possible, install in the #1 position.
9-8. Marker Beacon	1	1	0	**(B/L)** Available approaches dictate requirement.
9-9. Inertial Navigation Systems (INUs)	3	3	2	**(B/L)** Three sources of attitude required (includes SAI). One INU inoperative procedures: Two fully operative INUs required. These should be installed in the #1 and #3 positions. Line missions--shall be repaired at next repair capable facility.
9-10. Fuel Savings Advisory System (FSAS)				
a. FSAS Computer	1	1	*	**(B/L)** Required for wind shear warning and flights in RVSM airspace (altitude alerting).
b. Display Interface Control Unit (DICU)	1	1	*	**(B/L)** Required for flights in RVSM airspace (altitude alerting).
9.11. Standby Attitude Indicator				
a. SAI	1	1	*	**(B/L)** See 9-9 and 9-18a Remarks/Limitations/Exceptions. Line missions--shall be repaired at next repair capable facility.
b. Air Data Unit	1	0	0	
9-12. CADC Select Switch	1	1	*	**(B/L)** Required for flights in RVSM airspace.
9-13. IFF	1	1	1	Mode 3A and C shall be operative.
a. Mode 4 Computer	1	1	0	**(B/L)** Do not delay takeoff except when the aircraft will transit an area where safe passage procedures are implemented. Inflight failures: Continue to intended destination. Where safe passage is implemented, follow procedures for inop Mode 4.
9-14. TCAS System				
a. TCAS Displays	2	1	0	Functional display may be installed at either position.
b. Mode S	1	0	0	Mission requirements dictate.
9-15. Interphone System				Shall be able to communicate with all occupied positions.
a. Cockpit Loudspeaker	3	3	1	
b. Microphone Switch (Yoke)	2	2	1	**(B)** Shall be repaired at next repair capable facility.
c. Microphone Switch (Floor)	2	1	*	Should be operative at engineer position. May be inoperative at navigator position except for SOLL and airdrop.

Table continued on next page.

Table 4.9. Avionics (Continued).

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
9-16. Public Address (PA) System	1	1	0	**(B/L)** If inoperative in troop compartment, interphone communications shall be maintained.
a. Troop Compartment PA	1	1	*	**(B/L)** Shall be operative when carrying passengers unless other means of communication is available (i.e., bullhorn).
9-17. Avionics Equipment Cooling System				
a. Avionics Cooling Fan	2	2	1	**(B/L)** Shall be repaired at next repair capable facility.
b. Cooling Fan Fail Light	2	2	1	**(B/L)** Light shall be operative for selected fan.
c. COMPT OVHT Light	1	1	0	**(B)** Periodically scan avionics compartment. Shall be repaired at next repair capable facility.
d. Cooling Effects Detector	1	1	0	**(B)** Periodically scan avionics compartment. Shall be repaired at next repair capable facility.
f. Panel Fan Fail Light	1	1	0	**(B)** Periodically check fan inflight. One-time flight to repair facility.
9-18. Flight Management System (FMS)				
a. Control Display Unit (CDU)	3	3	2	**(B/L)** Operative units should be installed in the #1 and #3 positions. INU associated with the inoperative CDU will not be operative. SAI shall be operative. Line missions--shall be repaired at next repair capable facility.
b. Bus-Subsystem Interface Unit (BSIU)	3	3	3	
c. Data Loader	1	1	*	**(B/L)** Mission dictates requirement.
d. GPS Key Fill Panel	2	1	*	**(B/L)** Mission dictates requirement.
e. FMS/INS Status Panel	2	2	1	**(B)** "Attd Fail, Hdg Fail, and CDU Msg" indicators should be operative. If these lights are inoperative, one-time flight to repair facility. Monitor associated CDU.
f. FMS Aux Control Panel	1	1	1	
g. FMS Master Power Control Panel	1	1	1	
h. Comm/Nav Radio Volume Control Panel	1	1	1	Portions may be inoperative; mission requirements dictate.
i. GPS Receiver Processor Unit (RPU)	3	3	0	**(B/L)** CDU with operative RPU must be installed in the pilot position. If a second is installed, it should be placed in the co-pilot position. Select the working GPS for the integrated nav solution. If all three RPUs are inoperative, all CDUs must be functional to place INUs in triple mix; refer to FLIP for RNP requirements. Line missions--shall be repaired at next repair capable facility. ***NOTE:*** One functional GPS receiver required for SOLL AMP-4 runway operations.
j. GPS Antenna	2	2	0	**(B/L)** Select the working GPS for the integrated nav solution. If both antennae are inoperative, all CDUs must be functional to place INUs in triple mix. Refer to 9-18i Remarks/Limitations/ Exceptions.
k. GPS Antenna Electronics Unit (AEU)	2	2	0	**(B/L)** Select the working GPS for the integrated nav solution. If both AEUs are inoperative, all CDUs must be functional to place INUs in triple mix. Refer to 9-18i Remarks/Limitations/ Exceptions.

Table continued on next page.

Table 4.9. Avionics (Continued).

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
9-19. Radar Altimeter	2	2	1	Considered operative with either analog or digital display. **(B/L)** For GPWS signals, pilot position should be operative. Both required for CAT II ILS approaches.
9-20. Weather Radar	1	1	*	**(B/L)** Shall be operative for all flights into areas of known or forecast thunderstorms.

Table 4.10. Recording and Emergency Location.

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
10-1. Emergency Locator Transmitter (ELT)	1	1	1	May be inoperative for local airland flights at or in the vicinity of home station. FIR shall be operative.
10-2. Flight Incident Recorder (FIR)	1	1	0	**(B)** FIR may be inoperative provided CVR is operative. Shall be repaired at next repair capable facility.
10-3. Cockpit Voice Recorder (CVR)	1	1	0	**(B)** CVR may be inoperative provided FIR (including all FIR inputs) is operative. Shall be repaired at next repair capable facility.

Table 4.11. MADAR. (Refer to Notes)

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
11-1. Signal Acquisition Remotes (SAR)				
SAR 01, 03	1	1	0	FIR input.
SAR 04	1	1	0	FIR input and required for engine vibration.
SAR 05	1	1	0	FIR input.
SAR 13, 14, 17, 18	1	1	0	FIR input.
SAR 19, 20, 21, 22	1	1	0	FIR input and required for engine vibration.
SAR 27, 28, 29	1	1	0	FIR input.
11-2. MADAR				
a. Controller (CNTRL)	1	1	0	**(B)** Shall be repaired at next repair capable facility.
b. Display Unit (DU)	1	1	0	**(B)** POU should be operative. If both DU and POU are inoperative, repair at next repair capable facility.
c. Printout Unit (POU)	1	1	0	**(B)** DU should be operative. If both DU and POU are inoperative, repair at next repair capable facility.
d. Maintenance Data Recorder (MDR)	1	1	0	**(B)** Shall be repaired at next repair capable facility.
e. Multiplexer/Processor (MUX/PROC)	1	1	0	**(B)** Required for FIR Input. May be inoperative provided CVR is operative. Shall be repaired at next repair capable facility.
f. Power Supply (P/S)	1	1	0	**(B)** Required for FIR Input. May be inoperative provided CVR is operative. Shall be repaired at next repair capable facility.
g. Signal Conditioner /Multiplex (SCM)	1	1	0	**(B)** Required for FIR Input. May be inoperative provided CVR is operative. Shall be repaired at next repair capable facility.

MADAR NOTES:

1. Both Engine Vibration Indicating (EVI) channels indicating vibration (fan or core) out of limits will require confirmation of engine condition by ground test equipment.

2. One EVI channel indicating vibration (fan or core) out of limits and the other channel inoperative will require confirmation of engine condition by ground test equipment.

3. One usable EVI channel indicating a vibration (fan or core) out of limits and one usable SAR channel indicating within limits suggests an indicating system malfunction. To determine if a indication malfunction exists apply the following:

3.1. If channel 08 mil value is more than 2.5 times greater than the channel 09 mil value or the channel 09 value is more than 1.1 times greater than the channel 08 value, an indicating system malfunction exists.

3.1.1. If an indicating system malfunction exists, the usable channel indicating vibration within limits will be used. Record the system malfunction as a discrepancy as in the AFTO Form 781A.

3.1.2. If an indicating system malfunction does not exist, the usable channel indicating the highest values will be used to determine vibration levels.

Table 4.12. Cargo Door System (Troop & Cargo).

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
12-1. Visor and Forward Ramp	1	1	1	May depart if manual override is required to open, close, or lock the visor or forward ramp assembly. **(A)** Do not depart with inoperative or missing locks on the visor and forward ramp. **(B/L)** Door locks may be inoperative if all locks are confirmed locked. Mission dicates requirement.
12-2. Forward Ramp Manual Locking Pin	8	8	8	
a. Yellow Streamer	8	8	0	
b. Mechanical Lock Indicator	10	10	0	Verify all locks are locked; lock indicator lights shall be operative. **(B/L)** Do not delay launch, repair as soon as practical.
12-3. Visor Door Mechanical Lock Indicator	23	23	0	Verify all locks are locked; lock indicator lights shall be operative. **(B/L)** Do not delay launch, repair as soon as practical.
12-4. Ramp Extension Support Jack	4	4	*	**(B/L)** Mission requirements dictate. Refer to T.O. 1C-5A-9 for loading limitations when less than four jacks are serviceable.
12-5. Aft Cargo Doors and Ramp	1	1	1	**(A)** Do not depart with inoperative or missing locks on the aft ramp, pressure, side or center doors. Do not depart when manual override is required to open, close, or lock the side, center, pressure doors, or aft ramp assembly. Do not depart when aft side cargo door sag interrupts normal electrical operation of the doors. **(B/L)** May use hydraulic manual override to operate the door system. Door locks may be inoperative if it can be determined the lock is positively locked, mission dictates requirement.

Table continued on next page.

Table 4.12. Cargo Door System (Troop & Cargo) (Continued).

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
12-6. Aft Ramp Manual Locking Pin	14	14	14	
a. Yellow Streamer	14	14	0	
b. Mechanical Lock Indicator	14	14	0	Verify all locks are locked; lock indicator lights shall be operative. **(B/L)** Do not delay launch, repair as soon as practical.

Table 4.13. Oxygen System.

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
13-1. 25 Liter Converter	1	1	0	**(B/L)** 25 liter converter may be inoperative provided the other converter is serviced with an adequate quantity for the proposed mission. May result in pax limitations. Line missions--shall be repaired at next repair capable facility.
13-2. 75 Liter Converter	1	1	0	**(B/L)** 75 liter converter may be inoperative provided the other converter is serviced with an adequate quantity for the proposed mission. Will result in pax limitations. Line missions--shall be repaired at next repair capable facility.
13-3. Oxygen Shut-off Valve	1	1	1	
13-4. Recharging Hose	10	10	*	**(B)** No more than one inoperative per compartment. Shall be repaired at next repair capable facility.
13-5. Flight Crew Oxygen Regulator	5	5	*	**(B)** P, CP, FE, and N (if applicable) positions shall be operative. Shall be repaired at next repair capable facility.
13-6. Relief Bunk Oxygen System	6	6	0	**(B/L)** Do not occupy bunk with inop regulator above FL 250.
13-7. Continuous Flow Oxygen Regulator	2	2	2	
13-8. Drop-Down Mask	101	*	*	One per passenger in each compartment. May result in pax limitations.
13-9. Oxygen Quantity Indicator (25 liter)	1	1	0	**(B/L)** 75 liter indicator shall be operative. If servicing capability exists, service 25 liter converter prior to launch.
13-10. Oxygen Quantity Indicator (75 liter)	1	1	0	**(B/L)** 25 liter indicator shall be operative. If servicing capability exists, service 75 liter converter prior to launch.
13-11. Quantity Low Light	2	2	1	**(B/L)** When serviced, corresponding gauge shall be operative.
13-12. Oxygen Quantity Indicator (25 liter) Test Switch	1	1	0	**(B/L)** When serviced, corresponding gauge shall be operative.
13-13. Oxygen Quantity Indicator (75 liter) Test Switch	1	1	0	**(B/L)** When serviced, corresponding gauge shall be operative.
13-14. Oxygen Warning System	1	1	1	**(B/L)** Not required for flights below 10,000 ft MSL. Shall be repaired at next repair capable facility. If passengers are on board, and the oxygen warning system is inoperative, the flight is limited to 10,000 ft MSL. If flight above 10,000 ft MSL is required, the crew will be on oxygen.
13-15. EPOS	90	*	*	One per passenger in each compartment. May result in pax limitations.
13-16. Portable Oxygen Bottles	16	16	12	**(B/L)** Ensure all troop compartment bottles are operative if troop compartment is occupied. If all troop compartment bottles are inop, crewmembers entering the troop compartment in flight must carry a supplemental oxygen bottle.

Table 4.14. Warning Systems.

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
14-1. Stallimiter System	2	1	1	One fully functioning system required for all departures.
14-2. Ground Proximity Warning System (GPWS)	1	1	1	If the GPWS is inoperative due to a bad radar altimeter in the pilot position, replace with copilot's radar altimeter. **(B/L)** Waivers may be granted on a case-by-case basis under certain crtieria e.g., day, VMC, no terrain, etc.
14-3. Wind Shear and Altitude Alert Warning	1	1	0	**(B)** Altitude alerting - RVSM airspace requirement. **(B/L)** Wind shear - Requires operable FSAS. If the wind shear alert/warning function is inoperative, the flight engineer will provide reference ground speed per T.O. 1C-5A-1.
14-4. Master Caution System	1	1	1	As long as safety-of-flight is not affected, some annunciator lights may be inoperative (e.g., flare inop, nose loc ant off, etc.). System shall be able to be reset. Aircraft may be flown with an annunciator light that will not reset as long as the master caution resets. Engineer caution panel shall be operative. Pilot/Copilot Master Caution/Auto lights shall be operative.
a. Master Caution Light	2	2	1	
b. Master Auto Light	2	2	1	
14-5. Door Warning System (Lock Status Lights)				
a. Visor	25	25	24	All Visor Lock Status lights shall be operative. **(B)** If all T.O. 1C-5A-1 Section III criteria are met, one lock may be in bypass. Repair as soon as practical.
b. Forward Ramp	2	2	0	**(B/L)** Lights may be inoperative provided mechanical pins are installed and the locks are verified to be locked. Repair as soon as practical.
c. Crew Entrance Door	1	1	1	
d. Aft Ramp	2	2	0	**(B/L)** Lights may be inoperative provided mechanical pins are installed and the locks are verified to be locked. Repair as soon as practical.
e. Fwd Underfloor Access Door	1	1	0	**(B/L)** Light may be inoperative provided the door is verified to be closed and locked. Repair as soon as practical.
f. Aft Winch Access Hatch	1	1	0	**(B/L)** Light may be inoperative provided the door is verified to be closed and locked. Repair as soon as practical.
g. Aft Bilge Access Hatch	1	1	0	**(B/L)** Light may be inoperative provided the door is verified to be closed and locked. Repair as soon as practical.
h. Forward Bilge Access Hatch	1	1	0	**(B/L)** Light may be inoperative provided the door is verified to be closed and locked. Repair as soon as practical.
i. Left and Right Side Cargo Doors	4	4	0	**(B/L)** Lights may be inoperative provided the door(s) are verified to be locked and the door is closed and locked.
j. Center Cargo Door	2	2	2	
k. Ramp to Pressure Door	4	4	2	**(B)** Outboard lights may be inoperative
14-6. Smoke Detector System	1	1	1	**(B)** If any component is inoperative, the associated compartment shall be scanned at least once every hour. FE 1301 detection system (if applicable) shall be fully operative. Troop compartment shall be occupied if detector is inop
14-7. Bailout Alarm	1	1	0	**(B)** PA should be operative. If PA system is inoperative, interphone communication shall be maintained.
14-8. Defensive System	1	*	*	Mission dictates requirement.

Table 4.15. Fire Suppression System (FSS). (Refer to Notes)

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
15-1. DEWARS	2	2	1	**(B/L)** Flight is permitted with one unserviceable DEWAR provided the system functions remain operative. Some malfunctions may require the DEWAR to be drained.
15-2. Nitrogen Fire Supression Control Panel	1	1	1	Shall be capable of fire warning and discharge. ***Exception:*** Discharge capability is N/A when LN2 is depleted.
15-3. Nose Wheel Well Control Panel	1	1	0	**(B)** Shall be repaired at next repair capable facility.
15-4. Optical Detection	1	1	0	**(B)** If any component is inoperative, associated compartment shall be scanned every hour. Smoke detection system shall be fully operative. One-time flight to repair capable facility.
15-5. Isolation Valve	2	2	1	**(B/L)** Isolation valve shall be operative for serviced DEWAR.
15-6. Outboard Main Tank ΔP Switch	2	2	0	**(B)** Do not pressurize wings. Shall be repaired at next repair capable facility.
15-7. Overboard Relief Valves	2	2	1	**(B/L)** Not required with unserviced DEWAR.
15-8. Pressure Limiters	2	2	1	**(B/L)** Not required with unserviced DEWAR.
15-9. Primary Climb/Dive Valve	2	2	0	**(B/L)** Secondary climb/dive valve must be operative. Manual override shall be operative.
15-10. Primary Regulator	2	2	1	**(B/L)** Not required with unserviced DEWAR.
15-11. Secondary Climb/Dive Valve	2	2	0	**(B/L)** Primary climb/dive valve must be operative. Manual override shall be operative.
15-12. Secondary Pressure Regulator	2	2	1	**(B/L)** Not required with unserviced DEWAR.
15-13. Vent Box Float Switch	2	2	2	
15-14. Wing Pressure Warning System	2	2	2	
15-15. Liquid Nitrogen Service Panel	1	1	1	**(B)** As long as safety-of-flight is not affected, some functions may be inoperative. Repair at next repair capable facility.
15-16. Central Processing Unit (CPU)	1	1	1	Shall be capable of fire warning and discharge. ***Exception:*** Discharge capability is N/A when LN2 is depleted.
15-17. FSS Fire Detection	1	1	1	

FSS NOTES:

1. LN2 Servicing. Because of the increased safety margin provided by the FSS, obtain full LN2 servicing at stations with servicing capability.

1.1. Minimum Servicing Requirements:

1.1.1. Home Station Departures. The airplane will be fully serviced--650 pounds per DEWAR to allow for gauge inaccuracies, automatic shutoff settings, and LN2 boil-off.

1.1.2. En route Stations With Servicing Capability. Depart en route stations with enough LN2 (plus fire fighting reserve) to last to the next station with servicing capability.

1.1.2.1. Do not delay mission progress if unable to obtain LN2 servicing due to temporary outages or servicing equipment problems.

1.1.3. En route Stations Without Servicing Capability. The mission may continue regardless of the amount of LN2 on board. If the remaining LN2 will be depleted prior to the next en route stop, vent wings to retain a fire fighting reserve. Do not vent wings until just prior to descent; make an AFTO Form 781information entry.

1.1.4. Local Missions. Not less than that required for the planned mission duration (plus an adequate fire fighting reserve). For ERCCs, airplanes will be fully serviced for the first half to ensure the second half will have adequate LN2.

1.2. General Requirements.

1.2.1. Flight is not permitted with system LN2 (liquid nitrogen) leaks in excess of 50 pounds per DEWAR per 12 hours. Allow 1 hour after servicing for system stabilization prior to start of leak check.

1.2.2. Use the following values to calculate the minimum amount of LN2 required by paragraphs 1.1.2 and 1.1.4. These values are guides; amounts used may vary. Document significant variations in AFTO Form 781. Two hundred fifty (250) pounds required for fire fighting (adequate for one application to the largest zone) plus:

1.2.2.1. Twelve pounds for every 1,000-feet of descent planned during a line or AR mission. EXAMPLE: An AR mission that requires an 8,000-foot descent from initial level off altitude to rendezvous altitude, followed by a final cruise altitude of FL370 will need 540 pounds of LN2. (8,000 + 37,000 = 45,000 feet of total descent x 12 = 540 pounds).

1.2.2.2. One hundred twenty (120) pounds will be used for each hour of local transition flying.

Table 4.16. Emergency Equipment.

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
16-1. Life Raft/Survival Kit	4	4	1	**(B/L)** Troop compartment rafts may be inoperative or missing; however, total troop passengers will be reduced by 25 per inoperative raft. A raft shall be installed at the #2 escape hatch and #6 service door (#6 service door requirement N/A when troop compartment is unoccupied). ***Exception:*** Locals/Depot sorties may operate without a life raft provided the flight will not take place over water; a survival kit will be carried.
16-2. Descent Reel	24	24	*	**(B/L)** One per occupant on the flight deck.
16-3. Escape Slide/Exit	5	5	2	When troop compartment is occupied, an exit/slide shall be operative at #4 hatch and #6 service door. **(B/L)** Limit troop compartment to 40 passengers/crew when any exit or slide is inoperative. An escape slide shall be installed at the #5 and #6 service doors (#6 service door requirement N/A when troop compartment is unoccupied).
16-4. Escape Rope	8	8	*	**(B/L)** Three escape ropes shall be installed in the cargo compartment, one above the troop compartment ladder, and one at each exit in the troop compartment that has an operative life raft or escape slide installed. Troop compartment exits are not considered operative unless an escape rope is installed.
16-5. First Aid Kit	22	22	*	**(B/L)** Full complement required when carrying personnel in the troop compartment. If troop compartment is not occupied, a minimum requirement of 5 on the flight deck and 2 in the cargo compartment.
16.6. Fire Extinguishers				
a. A-model aircraft	15	15	9	**(B)** Minimum of 3 operative extinguishers per compartment. Shall be replaced/repaired at next repair capable facility.
b. B-model aircraft	17	17	10	**(B)** Minimum of 3 operative extinguishers per compartment, plus 1 additional 1-gallon extinguisher in cargo compartment. Shall be replaced/repaired at next repair capable facility.
16.7. Life Vest	95	*	*	One per occupant during over water flights. May result in pax limitations.
16-8. Crash Axe	3	3	2	**(B)** A minimum of one crash axe shall be available on the flight deck and one available in the troop.

Table continued on next page.

Table 4.16. Emergency Equipment (Continued).

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
16-9. Emergency Exit Light	12	12	*	Required for all operative exits. An emergency exit light may be repaired by replacing (2) 327 bulbs if not charging. **(B/L)** Troop compartment lights not required when compartment is unoccupied. May result in pax limitations.
16-10. Rope Ladder	1	1	*	Both release handles required to consider ladder operative. **(B)** Not required if emergency escape slide and emergency descent reels (1 per occupant) are operative. Shall be repaired at next repair capable facility.
16-11. FE 1301	20	*	*	Bottles may be inoperative as long as detection system is operative. Two additional 1-gallon fire extinguishers shall be placed in the cargo compartment. **(B)** If two additional 1-gallon fire extinguishers are not available, one-time flight to repair capable facility.

Table 4.17. Miscellaneous Equipment.

Item/System	Installed	Required		
		A	B	Remarks/Limitations/Exceptions
17-1. Lock Blocks, Pressure Door Hinge	2	2	*	**(B/L)** Mission dictates requirement.
a. F-valve Safety Guard	1	1	0	
17-2. Night Curtain	2	*	*	Both required for night SOLL operations.
17-3. Scroll Checklist Holder	4	2	0	Should be operable at copilot and flight engineer positions.
17-4. Service Door Safety Gate	2	2	0	
17-5. Window Shade	12	*	*	Twelve required for SOLL operations per Addenda B. **(A)** Six required, installed in cargo compartment. **(B)** Non-tactical--if shades are missing, install six in cargo compartment. If six shades are not available, fabricate covers for cargo compartment windows.
17-6. Winch	2	*	*	One required for all cargo missions. SOLL missions will carry 2 hydraulic winches.
17-7. Water System, Potable	1	*	*	When serviced, all functions shall be operative. If inoperative, system shall be drained prior to flight.

Note: Pages 60 thru 63 omitted.

Chapter 5

OPERATIONAL PROCEDURES

5.1. Checklists. A checklist is not complete until all items have been accomplished. Momentary hesitations for coordination items, ATC interruptions, and deviations specified in the flight manual, etc., are authorized. Notes amplifying checklist procedures or limitations may be added to the checklists (in pencil).

5.1.1. Checklist Inserts. Units may supplement T.O. guidance with HQ AMC/DOV approved checklist inserts. These inserts may be placed at the end of the appropriate checklist or in an in-flight guide. All checklist inserts must have a POC. If any crewmember has recommendations or changes they should contact the POC. The POC will consolidate inputs and submit changes to HQ AMC/DOV for approval. Local in-flight guides and inserts not affecting T.O. guidance and procedures may be locally developed and OGV approved.

5.2. Duty Station. A qualified pilot will be in control of the aircraft at all times during flight. (***EXCEPTION:*** Unqualified pilots undergoing qualification training and senior staff members who have completed the Senior Officer Qualification Course). The aircraft commander, copilot, flight engineer, and navigator will be at their duty stations during all critical phases of flight. During other phases of flight, crewmembers may leave their duty station to meet physiological needs and perform normal crew duties provided a qualified pilot is in control of the aircraft and a qualified engineer is at the engineer's panel at all times. When additional aircrew personnel are on board, the observer's seat should be occupied to assist the crew in avoiding other aircraft during ground operations, takeoffs, departures, low-levels, penetrations, approaches and landings. Crewmembers will notify the pilot prior to departing assigned primary duty stations.

***EXCEPTION*:** On augmented missions when two or more ARs are scheduled and the crew contains more than one AR qualified AC, an AR AC (not necessarily the "A" coded AC on the flight orders) must be in the seat during refueling operations.

NOTE:

An additional pilot, if available (preferably C-5 qualified), should occupy the observer's seat during all ground operations, departures, approaches, and landings. In addition to scanning for other aircraft, the pilot in the observer's seat should maintain situational awareness and actively monitor the departure or approach being flown.

5.3. Flight Station Entry. ACs may permit passengers and observers access to the flight station during takeoff, climb, AR, descent, and landing only if seats with seat belts are available. Passengers and observers will not be permitted access to a primary crew position (P, CP, FE) regardless of its availability. In all cases, sufficient oxygen sources must be available to meet the requirements of AFI 11-202V3.

5.3.1 At his or her discretion, the AC may release seats for passenger accommodation in the flight station, relief crew compartment, or courier compartment. Before placing passengers on the flight deck, consider crew size, duration of flight, etc. A maximum of 20 crewmembers and passengers are authorized seating on the flight deck, subject to oxygen and life vest availability.

5.3.1.1. The AC will designate a qualified C-5 crewmember to ensure the safety of passengers on the flight deck when only two loadmasters are part of the crew and both are required in the troop